

(12) **United States Patent**  
Tsukuda et al.

(10) Patent No.: **US 6,274,220 B1**  
(45) Date of Patent: **\*Aug. 14, 2001**

(54) **AROMATIC POLYAMIDE RESIN  
MOLDINGS, PRODUCTION METHODS  
THEREOF, AND MAGNETIC RECORDING  
MEDIUM PRODUCED THEREFROM**

(75) Inventors: **Akimitsu Tsukuda, Kyoto; Masanori  
Sueoka, Shiga; Toshihiro Tsuzuki,  
Kyoto, all of (JP)**

(73) Assignee: **Toray Industries, Inc. (JP)**

(\*) Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/066,312**

(22) PCT Filed: **Aug. 29, 1997**

(86) PCT No.: **PCT/JP97/03036**

§ 371 Date: **Apr. 28, 1998**

§ 102(c) Date: **Apr. 28, 1998**

(87) PCT Pub. No.: **WO98/08892**

PCT Pub. Date: **Mar. 5, 1998**

(30) **Foreign Application Priority Data**

Aug. 29, 1996 (JP) ..... 8-229019  
Aug. 29, 1996 (JP) ..... 8-229020

(51) Int. Cl.<sup>7</sup> ..... **G11B 8/73; G11B 5/78**

(52) U.S. Cl. .... **428/141; 428/323; 428/458;  
428/474.4; 428/477.7; 428/694 SL; 428/694 SG;  
428/900; 156/242; 156/244.24**

(58) Field of Search ..... **428/323, 325,  
428/328, 329, 330, 331, 688, 694 T, 394 TS,  
694 TB, 694 TR, 458, 474.4, 477.7, 539.5,  
900, 928, 545, 611, 612, 694 BR, 694 BA,  
394 SG, 141, 694 SL; 156/242, 244.24**

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

4,645,702 \* 2/1987 Asakura et al. .... 428/141  
5,686,166 \* 11/1997 Tsukuda et al. .... 428/141  
5,780,387 \* 7/1998 Harada ..... 503/226  
5,886,819 \* 3/1999 Murata et al. .... 359/483

**FOREIGN PATENT DOCUMENTS**

0 702 359 3/1996 (EP) .  
0 702 361 3/1996 (EP) .  
0 842 754 5/1998 (EP) .  
882759A1 \* 12/1998 (EP) .  
60-127523A \* 7/1985 (JP) .  
01247162A \* 10/1989 (JP) .  
10265589A \* 10/1998 (JP) .  
11003513A \* 1/1999 (JP) .  
11106529A \* 4/1999 (JP) .

\* cited by examiner

*Primary Examiner*—Steven A. Resan

(74) *Attorney, Agent, or Firm*—Schnader Harrison Segal & Lewis LLP

(57) **ABSTRACT**

The present invention provides aromatic polyamide resin moldings comprising at least one surface that is 1.0 nm or more in root-mean-square roughness and is 80 nm or less in 10-point average roughness, both of the roughness being as determined by atomic force microscopy, and that is 9.8 GPa or more in tensile Young's modulus at least in one direction. Such aromatic polyamide resin moldings serve effectively as material for film, film for magnetic recording medium in particular, that is highly resistant to scraping and has highly uniform surface protrusions.

**20 Claims, No Drawings**